

# Volume Contents

## Number 1 — January

S. Kahne	1	A Message from the IFAC President
H. Kwakernaak	3	New Faces—More Issues—Increasing service
	5	A Message from the Publishers
V. Kučera	7	Automatica Prize Paper Awards 1993

## SPECIAL ISSUE ON STATISTICAL SIGNAL PROCESSING AND CONTROL

Guest Editors: B. Ottersten, T. Söderström and B. Wahlberg

B. Ottersten	9	Statistical Signal Processing and Control
		<b>PAPERS</b>
K. V. S. Hari and U. Gummadaelli	11	Effect of Spatial Smoothing on the Performance of Subspace Methods in the Presence of Array Model Errors
H. Krim and J. G. Proakis	27	Smoothed Eigenspace-based Parameter Estimation
F. T. Luk and S. Qiao	39	A New Matrix Decomposition for Signal Processing
Y. M. Cho, G. Xu and T. Kailath	45	Fast Recursive Identification of State Space Models via Exploitation of Displacement Structure
M. Verhaegen	61	Identification of the Deterministic Part of MIMO State Space Models given in Innovations Form from Input-Output Data
P. Van Overschee and B. De Moor	75	N4SID: Subspace Algorithms for the Identification of Combined Deterministic-Stochastic Systems
Q. Zhang, M. Basseville and A. Benveniste	95	Early Warning of Slight Changes in Systems
W. M. Steedly, C.-H. J. Ying and R. L. Moses	115	Statistical Analysis of TLS-based Prony Techniques
P. Stoica, P. Handel and T. Söderström	131	Approximate Maximum Likelihood Frequency Estimation
J.-J. Fuchs	147	Multiscale Identification of Real Sinusoids in Noise
H. Yang and Y. Hua	157	Statistical Analysis of an Eigendecomposition Based Method for 2-D Frequency Estimation
	169	Biographical Notes on Contributors to this Issue

## Number 2 — February

R. David and H. Alla	175	<b>SURVEY PAPER</b> Petri Nets for Modeling of Dynamic Systems—a Survey
		<b>PAPERS</b>
A. H. Levis, N. Moray and B. Hu	203	Task Decomposition and Allocation Problems and Discrete Event Systems
G. Johanness, A. H. Levis and H. G. Stassen	217	Theoretical Problems in Man-machine Systems and Their Experimental Validation
B. Kuipers and K. Åström	233	The Composition and Validation of Heterogeneous Control Laws
P. G. Voulgaris, M. A. Dahleh and L. S. Valavani	251	$\mathcal{H}^\infty$ and $\mathcal{H}^2$ Optimal Controllers for Periodic and Multirate Systems
L. Ljung and T. Glad	265	On Global Identifiability for Arbitrary Model Parametrizations
Y.-Y. Wang, P. M. Frank and N. E. Wu	277	Near-optimal Control of Nonstandard Singularly Perturbed Systems

C. W. Scherer	293	<b>The State-feedback <math>H_\infty</math>-problem at Optimality</b>
T. Bohlin	307	<b>A Case Study of Grey Box Identification</b>
A. Bermudez and A. Martinez	319	<b>A State Constrained Optimal Control Problem Related to the Sterilization of Canned Foods</b>
		<b>BRIEF PAPERS</b>
P. A. V. Ferreira and T. C. D. Borges	331	<b>System Modeling and Optimization Under Vector-valued Criteria</b>
A. Ilchmann and E. P. Ryan	337	<b>Universal <math>\lambda</math>-tracking for Nonlinearly-perturbed Systems in the Presence of Noise</b>
E. Fornasini, G. Marchesini and M. E. Valcher	347	<b>On the Structure of Finite Memory and Separable Two-dimensional Systems</b>
Ö. Morgül	351	<b>Control and Stabilization of A Rotating Flexible Structure</b>
		<b>TECHNICAL COMMUNIQUEs</b>
M. Eslami	357	<b>Stability Robustness Analysis of Discrete-time Systems with Multiple Large Parameter Variations</b>
S.-K. Chang and P.-L. Hsu	363	<b>Comments on "Sensitivity of Failure Detection Using Generalized Observers"</b>
		<b>BOOK REVIEWS</b>
T. E. Marlin	365	<b><i>Integrated Process Control and Automation</i> by J. E. Rijnsdorp</b>
M. Rimvall	367	<b><i>Computer-aided Analysis and Design of Linear Control Systems</i> by M. Jamshidi, M. Tarokh and B. Shafai</b>
A. Vaněček	369	<b><i>Controlled and Conditioned Invariants in Linear System Theory</i> by G. Basile and G. Marro</b>
A. Patra	371	<b><i>Block Pulse Functions and Their Applications in Control Systems</i> by Z. H. Jiang and W. Schaufelberger</b>
	373	<b>Biographical Notes on Contributors to this Issue</b>

## Number 3 — March

		<b>PAPERS</b>
L. Foulloy and B. Zavidovique	379	<b>Towards Symbolic Process Control</b>
T. Zhou and H. Kimura	391	<b>Simultaneous Identification of Nominal Model, Parametric Uncertainty and Unstructured Uncertainty for Robust Control</b>
G. F. Wredenhagen and P. R. Bélanger	403	<b>Piecewise-linear LQ Control for Systems with Input Constraints</b>
J. Lunze	417	<b>Qualitative Modelling of Linear Dynamical Systems with Quantized State Measurements</b>
P. M. J. Van den Hof	433	<b>Model Sets and Parametrizations for Identification of Multivariable Equation Error Models</b>
M. Niedźwiecki	447	<b>Identification of Time-varying Systems with Abrupt Parameter Changes</b>
M. J. Er, B. D. O. Anderson and W.-Y. Yan	461	<b>Gain Margin Improvement Using Generalized Sampled-data Hold Function Based Multirate Output Compensator</b>
J. E. McInroy and G. N. Saridis	471	<b>Techniques for Selecting Pose Algorithms</b>
		<b>BRIEF PAPERS</b>
W. H. Kwon, K. S. Lee and J. H. Lee	489	<b>Fast Algorithms for Optimal FIR Filter and Smoother of Discrete-time State-space Models</b>
H.-J. Guo, T. Ishihara and H. Takeda	493	<b>A State-space Parametrization of Discrete-time Two-degree-of-freedom Integral Controllers</b>
I. R. Gurov and G. Tadmor	499	<b>On the Robustness of <math>H_\infty</math> State Feedback Control to Nonlinear Perturbations</b>
P. N. Paraskevopoulos and K. G. Arvanitis	503	<b>Exact Model Matching of Linear Systems Using Generalized Sampled-data Hold Functions</b>



A. Casavola and E. Mosca	507	Minimax LQ Exact and Inexact Model Matching Problems
A. M. Stamatelos	513	On-line Regeneration Control for a Diesel Particulate Trap System
H. Ying	521	Sufficient Conditions on General Fuzzy Systems as Function Approximators
A. Datta	527	On the Transient Behaviour in Discrete-time Model Reference Adaptive Control: Analysis and Possible Improvement
F. Lin	533	Analysis of Temporal Performance of Supervised Discrete Event Systems
J. Ragot and D. Maquin	537	An Algorithm for Obtaining the Redundancy Equations of LTI Systems
C. Wen	543	TECHNICAL COMMUNIQUE Decentralized Robust Control of Class Unknown Interconnected Systems
M. Boutayeb and M. Darouach	545	Comments on "A Computationally Efficient Technique for State Estimation of Non-linear Systems"
S. Dasgupta, B. D. O. Anderson and R. J. Kaye	547	Persistence of Excitation Conditions for Partially Known Systems
A. Hansson	551	A Stochastic Interpretation of Membership Functions
S. Bittanti and G. De Nicolao	555	BOOK REVIEW <i>The Autonomous Linear Quadratic Control Problem: Theory and Numerical Solutions</i> by V. M. Mehrmann
	557	Biographical Notes on Contributors to this Issue

## Number 4 — April

D. J. N. Limebeer	563	EDITORIALS Control Systems Software Reviews
H. Kwakernaak	565	Introduction to the Special Section
S. F. Graebe	567	SPECIAL SECTION PAPERS Robust and Adaptive Control of an Unknown Plant: A Benchmark of New Format
Chisci, L. Giarrè and E. Mosca	577	Indirect and Implicit Adaptive Predictive Control of the Benchmark Plant
P. A. Cook	585	Application of Model Reference Adaptive Control to a Benchmark Problem
Ph. de Larminat and P. Houizot	589	Application of ACSYDE (Automatic Control System Design) to the IFAC-93 Benchmark
B. A. Foss and S. O. Wasbø	593	Benchmark IFAC 93: Adaptive Predictive PI-control of an Unknown Plant
O. Hecker, T. Knapp and R. Isermann	599	Robust Adaptive Control of a Time Varying Process Using Parallel Recursive Estimators
M. M'Saad and I. Hejda	605	Partial State Reference Model (Adaptive) Control of a Benchmark Example
I. Postlethwaite, J. F. Whidborne, G. Murad and D.-W. Gu	615	Robust Control of the Benchmark Problem Using $H_\infty$ Methods and Numerical Optimization Techniques
T.-W. Yoon and D. W. Clarke	621	Adaptive Predictive Control of the Benchmark Plant
T. Zhou and H. Kimura	629	Robust Control of the Sydney Benchmark Problem with Intermittent Adaptation
A. Naim and M. Kam	633	PAPERS On-line Estimation of Probabilities for Distributed Bayesian Detection
A. Tesi, A. Vicino and G. Zappa	643	Design Criteria for Robust Strict Positive Realness in Adaptive Schemes
J. Nie and D. A. Linkens	655	FCMAC: a Fuzzified Cerebellar Model Articulation Controller with Self-organizing Capacity
A. J. Koivo and S. H. Arnautovic	665	Control of Redundant Manipulators with Constraints Using a Reduced Order Model

R. G. Hakvoort, R. J. P. Schrama and P. M. J. Van den Hof	679	<b>Approximate Identification with Closed-loop Performance Criterion and Application to LQG Feedback Design</b>
A. Messmer and M. Papageorgiou	691	<b>Automatic Control Methods Applied to Freeway Network Traffic</b>
D. Y. Xu	703	<b>BRIEF PAPERS</b> <b>Robust Stability of Neutral Delay Differential Systems</b>
J. H. Lee, M. Morari and C. E. Garcia	707	<b>State-space Interpretation of Model Predictive Control</b>
J. S. Luo, A. Johnson and P. P. J. Van den Bosch	719	<b>Minimax Guaranteed Cost Control for Linear Continuous-time Systems With Large Parameter Uncertainty</b>
L. F. Godbout, Jr, D. Jordan and M. E. Striefler	723	<b>Pole Placement Algorithms for Multirate-sampled Linear Systems</b>
A. Likar and A. Dobnikar	729	<b>TECHNICAL COMMUNIQUE</b> <b>On-line Correction of the Gain in Kalman Filtering</b>
S. Marshall	731	<b>BOOK REVIEW</b> <i>Machine Vision: Automated Visual Inspection and Robot Vision</i> by D. Vernon
O. H. Bosgra, P. F. Lambrechts and M. Steinbuch	733	<b>SOFTWARE REVIEW</b> <i><math>\mu</math>-analysis and Synthesis Toolbox (<math>\mu</math>-tools)</i> by G. J. Balas, J. C. Doyle, K. Glover, A. Packard and R. Smith
	737	<b>Biographical Notes on Contributors to this Issue</b>

## Number 5 — May

A. Bagchi and P. ten Brummelhuis	745	<b>PAPERS</b> <b>Parameter Identification in Tidal Models with Uncertain Boundaries</b>
K.-V. Ling and A. L. Dexter	761	<b>Expert Control of Air-conditioning Plant</b>
J. E. Larsson	775	<b>Diagnostic Reasoning Strategies for Means-End Models</b>
P. M. Frank and X. Ding	789	<b>Frequency Domain Approach to Optimally Robust Residual Generation and Evaluation for Model-based Fault Diagnosis</b>
H. Raghav Rao	805	<b>Two Schemes for Information Acquisition: An Entropic Assessment</b>
P.-Y. Huang and B.-S. Chen	817	<b>Robust Tracking of Linear MIMO Time-varying Systems</b>
F. van Diggelen and K. Glover	831	<b>A Hadamard Weighted Loop Shaping Design Procedure for Robust Decoupling</b>
G. Lebret and J. J. Loiseau	847	<b>Proportional and Proportional-derivative Canonical Forms for Descriptor Systems with Outputs</b>
T. Y. Chai and Z. Tao	865	<b>BRIEF PAPERS</b> <b>A New Model Reference Robust Adaptive Controller in the Presence of Unmodeled Dynamics and Bounded Disturbances</b>
H. Bleuler, D. Vischer, G. Schweitzer, A. Traxler and D. Zlatnik	871	<b>New Concepts for Cost-effective Magnetic Bearing Control</b>
V.-T. Liu and C.-L. Lin	877	<b>Robust Stabilization for Composite Observer-based Control of Discrete Systems</b>
P. R. Bélanger, O. Arafat, M. Gaber, S. Gendron and D. Vurgait-Cherson	883	<b>Direct Performance Optimization Using Laguerre Models</b>
H. Zhang, C. Z. Han, B. W. Wan and R. Shi	887	<b>Identification and Control of a Large Kinescope Glass Furnace</b>
B. De Moor, M. Gevers and G. C. Goodwin	893	<b><math>L_2</math>-overbiased, <math>L_2</math>-underbiased and <math>L_2</math>-unbiased Estimation of Transfer Functions</b>
S.-B. Choi, D.-W. Park and S. Jayasuriya	899	<b>A Time-varying Sliding Surface for Fast and Robust Tracking Control of Second-order Uncertain Systems</b>
C. Xiaotian, L. Zhang and J. C. Readle	905	<b>The Analytic Formulas of the Ripple-free Tracking Problem</b>



R. Lozano, X.-H. Zhao and R. G. Moctezuma	909	<b>TECHNICAL COMMUNIQUE</b> <b>Singularity-free Adaptive Pole Placement for Second-order Systems</b>
P. Myszkowski	913	<b>On the Stability of Discrete-time Linear Interval Systems</b>
G. E. Coxson	915	<b>Remarks on an Affinity Condition in "A Survey of Extreme Point Results for Robustness of Control Systems"</b>
J. Kadlec	917	<b>BOOK REVIEW</b> <i>Parallel Processing in Digital Control</i> by D. F. G. Nocetti and P. J. Fleming
E. M. Kasenally	919	<b>SOFTWARE REVIEW</b> <i>Robust Control Toolbox</i> by R. Y. Chiang and M. G. Safonov
	921	<b>Biographical Notes on Contributors to this Issue</b>

## Number 6 — June

J. Howell	929	<b>PAPERS</b> <b>Model-based Fault Detection in Information Poor Plants</b>
E. Yaz and R. E. Skelton	945	<b>Parametrization of All Linear Compensators for Discrete-time Stochastic Parameter Systems</b>
M. Hovd and S. Skogestad	957	<b>Control of Symmetrically Interconnected Plants</b>
S. G. Choi, M. A. Johnson and M. J. Grimble	975	<b>Polynomial LQG Control of Back-Up-Roll Eccentricity Gauge Variations in Cold Rolling Mills</b>
A. De Luca and S. Panzieri	993	<b>An Iterative Scheme for Learning Gravity Compensation in Flexible Robot Arms</b>
N. Sivashankar, I. Kaminer and P. P. Khargonekar	1003	<b>BRIEF PAPERS</b> <b>Optimal Controller Synthesis with <math>\mathcal{L}_2</math> Stability</b>
P. Foudopoulos, S. Kollias and C. Halkias	1009	<b>An Efficient Approach to the Detection of Bernoulli-Gaussian Processes</b>
W. M. Haddad and D. S. Bernstein	1015	<b>Parameter-dependent Lyapunov Functions and The Discrete-time Popov Criterion for Robust Analysis</b>
H. Krishnan, M. Reyhanoglu and H. McClamroch	1023	<b>Attitude Stabilization of A Rigid Spacecraft Using Two Control Torques: A Nonlinear Control Approach Based on the Spacecraft Attitude Dynamics</b>
J. Chen, J. S. Freudenberg and C. N. Nett	1029	<b>The Role of The Condition Number and The Relative Gain Array in Robustness Analysis</b>
H. Chapellat, L. H. Keel and S. P. Bhattacharyya	1037	<b>Extremal Robustness Properties of Multilinear Interval Systems</b>
H. In and C. Zhang	1043	<b>A Multirate Digital Controller for Model Matching</b>
C. Frangos and Y. Yavin	1051	<b>A Synthesis Procedure for Discrete Linear Time-dependent Control Systems</b>
Z. Qu and D. M. Dawson	1057	<b>Robust Control of Cascaded and Individually Feedback Linearizable Nonlinear Systems</b>
G. Feng, C. Zhang and M. Palaniswami	1065	<b>Stability of Input Amplitude Constrained Adaptive Pole Placement Control Systems</b>
B. Wittenmark	1071	<b>BOOK REVIEWS</b> <i>Advances in Adaptive Control</i> by K. S. Narendra, R. Ortega and P. Dorato
R. S. Benson	1071	<i>Introduction to Chemical Process Instrumentation</i> by I. Nagy
R. Daniel	1072	<i>Telerobotics, Automation and Human Supervisory Control</i> by T. B. Sheridan
R. Johansson	1073	<i>Model Reference Adaptive Control: From Theory to Practice</i> by H. Butler
J. B. Levy	1075	<i>Computer Systems for Automation and Control</i> by G. Olsson and G. Piani
	1077	<b>Biographical Notes on Contributors to this Issue</b>

## Number 7 — July

- |   |      |  |
|---|------|--|
| B. Armstrong-Hélouvry, P. Dupont<br>and C. Canudas de Wit | 1083 | <b>SURVEY PAPER</b><br><b>A Survey of Models, Analysis Tools and Compensation Methods for the Control of Machines with Friction</b>      |
| T. Chen and L. Qiu  | 1139 | <b>PAPERS</b><br><b><math>\mathcal{H}_\infty</math> Design of General Multirate Sampled-data Control Systems</b>                         |
| J. Schoukens, R. Pintelon and H. Van hamme                | 1153 | <b>Identification of Linear Dynamic Systems Using Piecewise Constant Excitations: Use, Misuse and Alternatives</b>                       |
| A. Leva, C. Maffezzoni and R. Scattolini                  | 1171 | <b>Self-tuning PI-PID Regulators for Stable Systems with Varying Delay</b>   |
| H. Ying   | 1185 | <b>Practical Design of Nonlinear Fuzzy Controllers with Stability Analysis for Regulating Processes with Unknown Mathematical Models</b> |
| L. Chisci and E. Mosca                                    | 1197 | <b>BRIEF PAPERS</b><br><b>MMSE Deconvolution via Polynomial Methods and its Dual LQG Regulation</b>                                      |
| E.-W. Bai and S. Raman                                    | 1203 | <b>Robust System Identification with Noisy Experimental Data: Projection Operator and Linear Algorithms</b>                              |
| B. Lehman and J. Bentsman                                 | 1207 | <b>Vibrational Stabilization and Calculation Formulas for Nonlinear Time Delay Systems: Linear Multiplicative Vibrations</b>             |
| D. Clarke   | 1213 | <b>BOOK REVIEW</b><br><b><i>Predictive Control</i> by R. Soeterboek</b>  |
|   | 1217 | <b>Biographical Notes on Contributors to this Issue</b>  |

## Number 8 — August

- |   |      |   |
|---|------|---|
| C. P. Jobling, P. W. Grant, H. A. Barker<br>and P. Townsend               | 1221 | <b>SURVEY PAPER</b><br><b>Object-oriented Programming in Control System Design: a Survey</b>  |
| G. C. Goodwin and M. Salgado  | 1263 | <b>PAPERS</b><br><b>Frequency Domain Sensitivity Functions for Continuous Time Systems Under Sampled Data Control</b>                     |
| A. Delopoulos and G. B. Giannakis   | 1271 | <b>Consistent Identification of Stochastic Linear Systems with Noisy Input-Output Data</b>  |
| L. Leyval, S. Gentil and S. Feray-Beaumont                                | 1295 | <b>Model-based Causal Reasoning for Process Supervision</b>   |
| T. Iwasaki and R. E. Skelton  | 1307 | <b>All Controllers for the General <math>\mathcal{H}_\infty</math> Control Problem: LMI Existence Conditions and State Space Formulas</b> |
| R. A. Hilhorst, J. van Amerongen, P. Löhnberg<br>and H. J. A. F. Tulleken | 1319 | <b>A Supervisor for Control of Mode-switch Processes</b>  |
| Qijun Xia, Ming Rao, Yiqun Ying<br>and Xuemin Shen                        | 1333 | <b>BRIEF PAPERS</b><br><b>Adaptive Fading Kalman Filter with an Application</b>   |
| Jeng-Ming Chen and Bor-Sen Chen   | 1339 | <b>A Higher-order Correlation Method for Model-order and Parameter Estimation</b>   |
| P. Crnošija, S. Bogdan and Z. Kovačić                                     | 1345 | <b>Sensitivity Model and Synthesis of Dead-beat Algorithms in Digital Servosystems</b>  |
|   | 1351 | <b>Biographical Notes on Contributors to this Issue</b>   |

## Number 9 — September

- |   |      |   |
|---|------|---|
| J. D. Paduano, L. Valavani, A. H. Epstein,<br>E. M. Greitzer and G. R. Guenette | 1357 | <b>PAPERS</b><br><b>Modeling For Control of Rotating Stall</b>                    |
| G. De Nicolao   | 1375 | <b>Cyclomonotonicity, Riccati Equations and Periodic Receding Horizon Control</b> |



Li Xu, O. Saito and K. Abe	1389	<b>The Design of Practically Stable <math>n</math>D Feedback Systems</b>
R. J. Elliott	1399	<b>Exact Adaptive Filters for Markov Chains Observed in Gaussian Noise</b>
		<b>BRIEF PAPERS</b>
Youyi Wang, D. J. Hill, R. H. Middleton and Long Gao	1409	<b>Transient Stabilization of Power Systems with an Adaptive Control Law</b>
Keum-Shik Hong and J. Bentsman	1415	<b>Application of Averaging Method for Integro-differential Equations to Model Reference Adaptive Control of Parabolic Systems</b>
P. Peleties and R. DeCarlo	1421	<b>Analysis of a Hybrid System Using Symbolic Dynamics and Petri Nets</b>
R. Palm	1429	<b>Robust Control by Fuzzy Sliding Mode</b>
D. S. Bayard	1439	<b>High-order Multivariable Transfer Function Curve Fitting: Algorithms, Sparse Matrix Methods and Experimental Results</b>
L. Guo, A. Schöne and Xiachun Ding	1445	<b>Control of Hydraulic Rotary Multi-motor Systems Based on Bilinearization</b>
P. G. Voulgaris, M. A. Dahleh and L. S. Valavani	1455	<b>Robust Adaptive Control: a Slowly Varying Systems Approach</b>
P. Lucibello	1463	<b>State Steering by Learning for a Class of Nonlinear Control Systems</b>
B. Zhou and N. K. Bose	1469	<b>A Unified Approach to Data Association in Multitarget Tracking</b>
Bin Yao, S. P. Chan and Danwei Wang	1473	<b>Variable Structure Adaptive Motion and Force Control of Robot Manipulators</b>
Jenq-Tzong H. Chan	1479	<b>Multivariable Control System Synthesis: an Experimental Data Based Numerical Approach</b>
A. Malmgren and K. Nordström	1485	<b>A Contraction Property for State Feedback Design of Linear Discrete-time Systems</b>
		<b>TECHNICAL COMMUNIQUEs</b>
Er-Wei Bai and M. S. Andersland	1491	<b>Stochastic and Worst Case System Identification Are Not Necessarily Incompatible</b>
B. A. León de la Barra S. and M. A. Fernández F.	1495	<b>Transient Properties of Type <math>m</math> Continuous Time Scalar Systems</b>
Chun-Yi Su and Y. Stepanenko	1497	<b>Adaptive Sliding Mode Control of Robot Manipulators: General Sliding Manifold Case</b>
F. Najson and E. Kreindler	1501	<b>On Compensation for Neglected Actuator Dynamics</b>
		<b>BOOK REVIEW</b>
R. A. Vingerhoeds	1503	<b><i>Applied Optimal Control and Estimation: Digital Design and Implementation</i> by F. R. Lewis</b>
	1505	<b>Biographical Notes on Contributors to this Issue</b>
	1511	<b>Erratum</b>

## Number 10 — October

		<b>PAPERS</b>
K.-E. Årzén	1513	<b>Grafcet for Intelligent Supervisory Control Applications</b>
J. M. Buffington, A. G. Sparks and S. S. Banda	1527	<b>Robust Longitudinal Axis Flight Control for an Aircraft with Thrust Vectoring</b>
Ching-Wei Kounq and J. F. MacGregor	1541	<b>Identification for Robust Multivariable Control: the Design of Experiments</b>
W. Gawronski	1555	<b>A Balanced LQG Compensator for Flexible Structures</b>
J. C. Geromel, J. Bernussou and P. L. D. Peres	1565	<b>Decentralized Control Through Parameter Space Optimization</b>
Sang Deuk Lee, Jietae Lee and Sunwon Park	1579	<b>Nonlinear Self-tuning Regulator for pH Systems</b>
H. K. Khalil	1587	<b>Robust Servomechanism Output Feedback Controllers for Feedback Linearizable Systems</b>

M. Hovd and S. Skogestad	1601	<b>BRIEF PAPERS</b> Sequential Design of Decentralized Controllers
Z. Shafiei and A. T. Shenton	1609	Tuning of PID-type Controllers for Stable and Unstable Systems with Time Delay
B. M. Chen, A. Saberi, Y. Shamash and P. Sannuti	1617	Construction and Parameterization of all Static and Dynamic $H_2$ -optimal State Feedback Solutions for Discrete-time Systems
W. Mielczarski and A. M. Zajaczkowski	1625	Nonlinear Field Voltage Control of a Synchronous Generator using Feedback Linearization
A. Van der Schaft	1631	<b>BOOK REVIEW</b> Nonlinear Systems Analysis by M. Vidyasagar
P. M. Van Dooren	1633	<b>SOFTWARE REVIEW</b> Control System Toolbox by A. Grace, A. Laub, J. Little and C. Thompson
	1635	Biographical Notes on Contributors to this Issue

## Number 11 — November

E. Ono, K. Takanami, N. Iwama, Y. Hayashi, Y. Hirano and Y. Satoh	1639	<b>PAPERS</b> Vehicle Integrated Control for Steering and Traction Systems by $\mu$ -synthesis
M. Lundh and K. J. Åström	1649	Automatic Initialization of a Robust Self-tuning Controller
S. Kotob, M. Badran, I. Al-Atiqi and M. Juraïdan	1663	Analysis and Applications of Self-tuning Controls in a Refining Process: Case Study
F. Badano, M. Bétemps and D. Thomasset	1677	Control of a Planar Fine Positioner Actuated by Metal Bellows
L. Christian and J. Freudenberg	1693	Limits on Achievable Robustness Against Coprime Factor Uncertainty
M. Krstić, I. Kanellakopoulos and P. V. Kokotović	1703	Passivity and Parametric Robustness of a New Class of Adaptive Systems
M. Yamashita, K. Fujimori, K. Hayakawa and H. Kimura	1717	Application of $H_\infty$ Control to Active Suspension Systems
L. Pronzato and E. Walter	1731	Minimum-volume Ellipsoids Containing Compact Sets: Application to Parameter Bounding
Chun-Hsiung Fang, Li Lee and Fan-Ren Chang	1741	Robust Control Analysis and Design for Discrete-time Singular Systems
A. Malmgren and K. Nordström	1751	<b>BRIEF PAPERS</b> Optimal State Feedback Control with a Prescribed Contraction Property
J. C. Gille, S. Wegrzyn and P. Vidal	1757	On Developmental Systems: Multilevel and Parallel Development
J. Ackermann	1761	Robust Decoupling, Ideal Steering Dynamics and Yaw Stabilization of 4WS Cars
P. P. Wang and Ching-Yu Tyan	1769	Fuzzy Dynamic System and Fuzzy Linguistic Controller Classification
V. Ž. Filipović and B. D. Kovačević	1775	On Robust AML Identification Algorithms
Y. Z. Tsypkin, D. J. Hill and A. J. Isaksson	1779	A Frequency-domain Robust Instability Criterion for Time-varying and Non-linear Systems
Ö. Morgül	1785	A Dynamic Control Law for the Wave Equation
J. Park, G. Rizzoni and W. B. Ribbens	1793	On the Representation of Sensor Faults in Fault Detection Filters
Y. W. Wang and D. S. Bernstein	1797	$H_2$ -suboptimal Stable Stabilization
M. Hou and P. C. Müller	1801	Design of Decentralized Linear State Function Observers
J. van Amerongen	1807	<b>BOOK REVIEWS</b> <i>Applied Digital Control—Theory, Design and Implementation</i> by R. J. Leigh
I. Troch	1808	<i>Simulation and Modelling of Continuous Systems—A Case Study Approach</i> by D. Matko, R. Karba and B. Zupancic



C. J. Harris	1810	<i>Neurocontrol</i> by H. Tolle and E. Ersu
R. A. Kennedy	1811	<i>Linear System Theory</i> by W. J. Rugh
	1815	Biographical Notes on Contributors to this Issue

## Number 12 — December

		<b>PAPERS</b>
Jie Chen, Guoxiang Gu and C. N. Nett	1825	<b>Worst Case Identification of Continuous Time Systems via Interpolation</b>
K. D. Mease and M. A. van Buren	1839	<b>Geometric Synthesis of Aerospace Plane Ascent Guidance Logic</b>
R. Nikoukhah	1851	<b>Innovations Generation in the Presence of Unknown Inputs: Application to Robust Failure Detection</b>
M. V. Kothare, P. J. Campo, M. Morari and C. N. Nett	1869	<b>A Unified Framework for the Study of Anti-windup Designs</b>
H. Krishnan and N. Harris McClamroch	1885	<b>Tracking in Nonlinear Differential-Algebraic Control Systems with Applications to Constrained Robot Systems</b>
P. M. Young	1899	<b>The Rank One Mixed <math>\mu</math> Problem and 'Kharitonov-type' Analysis</b>
A.-L. Elshafei, G. A. Dumont and A. Elnaggar	1913	<b>Adaptive GPC Based on Laguerre-filters Modelling</b>
P. Misra, P. Van Dooren and A. Varga	1921	<b>Computation of Structural Invariants of Generalized State-space Systems</b>
		<b>BRIEF PAPERS</b>
W. Hejmo	1937	<b>Time-optimal Feedback System Controlling a Discontinuous Dynamic Object Reaching a Moving Target</b>
P.-O. Gutman, K. Peleg and U. Ben-Hanan	1943	<b>Classification by Varying Features with an Erring Sensor</b>
A. L. Maitelli and T. Yoneyama	1949	<b>A Two-stage Dual Suboptimal Controller for Stochastic Systems using Approximate Moments</b>
P. Hippe	1955	<b>Strictly Doubly Coprime Factorizations and all Stabilizing Compensators Related to Reduced-order Observers</b>
Kam-Chi Li, Tin-Pui Leung and Yue-Ming Hu	1961	<b>Sliding Mode Control of Distributed Parameter Systems</b>
M. S. Ahmed	1967	<b>An Innovation Representation for Nonlinear Systems with Application to Parameter and State Estimation</b>
R. Yusof, S. Omatu and M. Khalid	1975	<b>Self-tuning PID Control: a Multivariable Derivation and Application</b>
T. S. Schei	1983	<b>Automatic Tuning of PID Controllers Based on Transfer Function Estimation</b>
O. P. Palsson, H. Madsen and H. T. Sogaard	1991	<b>Generalized Predictive Control for Non-stationary Systems</b>
M. S. Ahmed	1999	<b>State Space Based Dual-rate Self-tuning</b>
		<b>TECHNICAL COMMUNIQUE</b>
S.-H. Park and Z. Bien	2009	<b><math>H_\infty</math> Control with Performance Bound for a Class of Uncertain Linear Systems</b>
A. Bemporad, L. Chisci and E. Mosca	2013	<b>On the Stabilizing Property of SIORHC</b>
	2017	<b>Biographical Notes on Contributors to this Issue</b>
	2023	<b>List of Reviewers for <i>Automatica</i>, 1994</b>
	I	<b>Volume Contents and Author Index for Volume 30, 1994</b>

